# Consortium of Medical Engineering and Dental Colleges of Karnataka (COMEDK)

## Undergraduate Entrance Test(UGET)

## Physics-2013

1. The difference between the apparent frequency of a source of sound as perceived by the observer during its approach and recession is 2% of the frequency of the source. If the speed of sound in air is $300 \text{ ms}^{-1}$, the velocity of the source is

(a) $1.5 \text{ ms}^{-1}$      (b) $12 \text{ ms}^{-1}$

(c) $6 \text{ ms}^{-1}$      (d) $3 \text{ ms}^{-1}$

2. Three long straight wires $A$, $B$ and $C$ are carrying currents as shown in figure. Then the resultant force on $B$ is directed
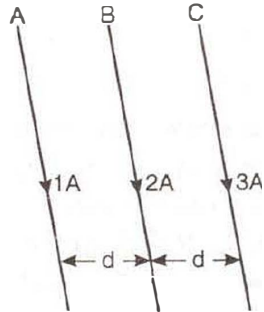


(a) perpendicular to the plane of paper and outward

(b) perpendicular to the plane of paper and inward

(c) towards $A$

(d) towards $C$

3. Curie-Weiss law is obeyed by iron :

(a) at Curie temperature only

(b) at all temperatures

(c) below Curie temperature

(d) above Curie temperature

4. A magnet N-S is suspended from a spring and when it oscillates, the magnet moves in and out of the coil C. The coil is connected to a galvanometer G. Then, as the magnet oscillates
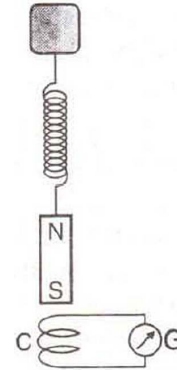


(a) G shows no deflection

(b) G shows deflection to the left and right but the amplitude steadily decreases

(c) G Shows deflection to the left and right with constant amplitude

(d) G shows deflection on one side.

5. The dimensional formula for inductance is :
   (a) $[ML^2 T^{-2} A^{-2}]$  (b) $[ML^2 TA^{-2}]$
   (c) $[ML^2 T^{-1} A^{-2}]$  (d) $[ML^2 T^{-2} A^{-1}]$

6. The maximum current that can be measured by a galvanometer of resistance $40\,\Omega$, is 10 mA. It is converted into a voltmeter that can read upto 50 V. The resistance to be connected in series with the galvanometer (in ohms) is
   (a) 2010        (b) 4050
   (c) 5040        (d) 4960

7. The spectrum obtained from the chromosphere of the sun at the time of total solar eclipse is :
   (a) line emission spectrum
   (b) band emission spectrum
   (c) continuous emission spectrum
   (d) line absorption spectrum

8. Heavy water is :
   (a) compound of deuterium and oxygen
   (b) water at 4°C
   (c) water, in which soap does not lather
   (d) compound of heavy oxygen and heavy hydrogen

9. The nuclear reactor at Kaiga is a :
   (a) research reactor  (b) fusion reactor
   (c) breeder reactor  (d) power reactor

10. When a body moves in a circular path, no work is done by the force since :
    (a) force and displacement are perpendicular to each other
    (b) the force is always away from the centre
    (c) there is no displacement
    (d) there is no net force

11. A bullet moving with a speed of $100\ ms^{-1}$ can just penetrate two planks of equal thickness. Then, the number of such planks penetrated by the same bullet when the speed is doubled will be :
    (a) 6             (b) 10
    (c) 4             (d) 8

12. Two bodies of masses 1 kg and 2 kg have equal momentum. Then, the ratio of their kinetic energies is
    (a) 2 : 1
    (b) 3 : 1
    (c) 1 : 3
    (d) 1 : 1

13. Absorption coefficient of an open window is :
    (a) 1
    (b) 0.25
    (c) zero
    (d) 0.5

14. The loudness and pitch of a sound note depend on :
    (a) intensity and velocity
    (b) frequency and velocity
    (c) intensity and frequency
    (d) frequency and number of harmonics

15. In Melde's experiment in the transverse mode, the frequency of the tuning fork and the frequency of the waves in the string are in the ratio
    (a) 2 : 1          (b) 4 : 1
    (c) 1 : 1          (d) 1 : 2

16. An electron is accelerated through a potential difference of 45.5 volt. The velocity acquired by it is (in $ms^{-1}$) :
    (a) $10^6$            (b) zero
    (c) $4 \times 10^6$        (d) $4 \times 10^4$

17. An unknown resistance $R_1$ is connected in series with a resistance of $10\,\Omega$. This combination is connected to one gap of a metre bridge while a resistance $R_2$ is connected in the other gap. The balance point is at 50 cm. Now, when the $10\,\Omega$ resistance is removed the balance point shifts to 40 cm. The value of $R_1$ is (in ohms)
    (a) 20
    (b) 10
    (c) 60
    (d) 40

18. In the circuit shown, the internal resistance of the cell is negligible. The steady state current in the 2 Ω resistor is :
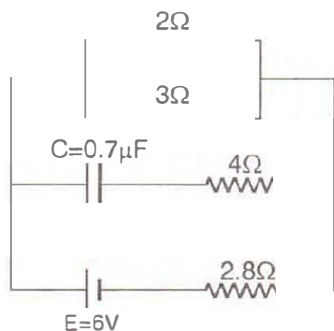


(a) 0.6 A        (b) 1.2 A
(c) 0.9 A        (d) 1.5 A

19. A rectangular coil of 300 turns has an average area of $25\,cm \times 10\,cm$. The coil rotates with a speed of 50 cps in uniform magnetic field of strength $4 \times 10^{-2}$ T about an axis perpendicular to the field. The peak value of the induced emf is (in volt)
(a) $300\,\pi$      (b) $3000\,\pi$
(c) $3\,\pi$        (d) $30\,\pi$

20. In an LCR circuit the potential difference between the terminals of the inductance is 60 V, between the terminals of the capacitor is 30 V and that between the terminals of resistance is 40 V. The supply voltage will be equal to
(a) 130 V       (b) 10 V
(c) 50 V        (d) 70 V

21. A vertical circular coil of radius 0.1 m and having 10 turns carries a steady current. When the plane of the coil is normal to the magnetic meridian, a neutral point is observed at the centre of the coil. If $B_H = 0.314 \times 10^{-4}$ T, the current in the coil is :
(a) 0.5 A       (b) 0.25 A
(c) 2 A        (d) 1 A

22. A thread is tied slightly loose to a wire frame as in figure and the frame is dipped into a soap solution and taken out. The frame is completely covered with the film. When the portion A is punctured with a pin, the thread :
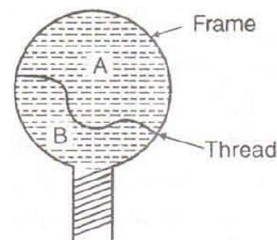


(a) becomes concave towards A
(b) becomes convex towards A
(c) either (a) or (b) depending on the size of A with respect to B
(d) remains in the initial position

23. Oxygen is 16 times heavier than hydrogen. Equal volumes of hydrogen and oxygen are mixed. The ratio of speed of sound in the mixture to that in hydrogen is
(a) $\sqrt{8}$       (b) $\sqrt{2/17}$
(c) $\sqrt{1/8}$      (d) $\sqrt{32/17}$

24. If two waves of the same frequency and amplitude respectively on superposition produce a resultant disturbance of the same amplitude, the waves differ in phase by :
(a) $\pi$    (b) zero   (c) $\pi/3$    (d) $2\pi/3$

25. A man, standing between two cliffs, claps his hands and starts hearing a series of echoes at intervals of one second. If the speed of sound in air is $340\,ms^{-1}$, the distance between the cliffs is
(a) 680 m      (b) 1700 m
(c) 340 m      (d) 1620 m

26. A beam of light of wavelength 600 nm from a source falls on a single slit 1 mm wide and the resulting diffraction pattern is observed on a screen 2 m away. The distance between the first dark fringes on either side of the central bright fringe is :
(a) 2.4 cm      (b) 2.4 mm
(c) 1.2 mm      (d) 1.2 cm

38. H-polaroid is prepared by :
    (a) orienting herapathite crystal in the same direction in nitrocellulose
    (b) using thin tourmaline crystals
    (c) stretching polyvinyl alcohol and then heated with dehydrating agent
    (d) stretching polyvinyl alcohol and then impregnating with iodiine

39. SI unit of permittivity is :
    (a) $C^2m^2N^2$
    (b) $C^2m^{-2}N^{-1}$
    (c) $C^2m^2N^{-1}$
    (d) $C^{-1}m^2N^{-2}$

40. A spherical drop of capacitance 1 μF is broken into eight drops of equal radius. Then, the capacitance of each small drop is
    (a) $\frac{1}{2}\,\mu F$
    (b) $\frac{1}{4}\,\mu F$
    (c) $\frac{1}{8}\,\mu F$
    (d) $8\,\mu F$

41. Two equal forces ($P$ each) act at a point inclined to each other at an angle of 120°. The magnitude of their resultant is
    (a) $P/2$
    (b) $P/4$
    (c) $P$
    (d) $2P$

42. Threshold wavelength for photoelectric emission from a metal surface is 5200 Å. Photoelectrons will be emitted when this surface is illuminated with monochromatic radiation from :
    (a) 1 W IR lamp
    (b) 50 W UV lamp
    (c) 50 W IR lamp
    (d) 10 W IR lamp

43. In Young's double slit experiment if monochromatic light used is replaced by white light, then :
    (a) no fringes are observed
    (b) only central fringe is white, all other fringes are coloured
    (c) all bright fringes become white
    (d) all bright fringes have colours between violet and red

44. Which state of triply ionised Beryllium ($Be^{+++}$) has the same orbital radius as that of the ground state of hydrogen ?
    (a) $n = 3$
    (b) $n = 4$
    (c) $n = 1$
    (d) $n = 2$

45. If $M$ is the atomic mass and $A$ is the mass number, packing fraction is given by :
    (a) $\dfrac{M}{M - A}$
    (b) $\dfrac{M - A}{A}$
    (c) $\dfrac{A}{M - A}$
    (d) $\dfrac{A - M}{A}$

46. A count rate meter shows a count of 240 per minute from a given radioactive source. One hour later the meter shows a count rate of 30 per minute. The half-life of the source is :
    (a) 80 min
    (b) 120 min
    (c) 20 min
    (d) 30 min

47. Two conductors of the same material have their diameters in the ratio 1 : 2 and their lengths in the ratio 2 : 1. If the temperature difference between their ends is the same, then the ratio of amounts of heat conducted per second through them will be :
    (a) 4 : 1
    (b) 1 : 4
    (c) 8 : 1
    (d) 1 : 8

48. Blowing air with open mouth is an example of :
    (a) isobaric process
    (b) isochoric process
    (c) isothermal process
    (d) adiabatic process.

49. Sound waves in air are always longitudinal because
    (a) of the inherent characteristics of sound waves in air
    (b) air does not have a modulus of rigidity
    (c) air is a mixture of several gases
    (d) density of air is very small

50. An uncharged sphere of metal is placed inside a charged parallel plate capacitor. The lines of force will look like :
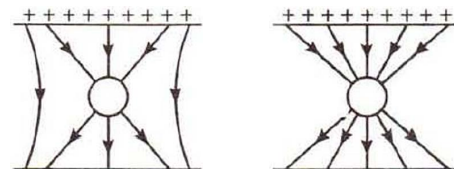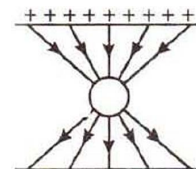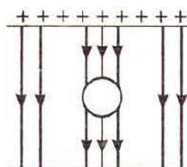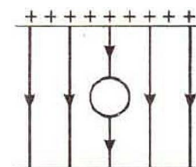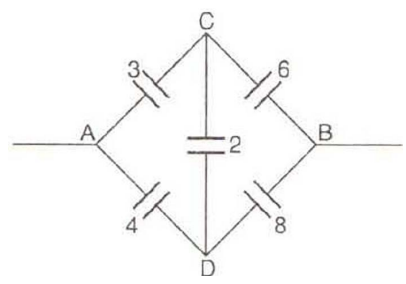


(a)    (b)
(c)    (d)

51. A current flows in a conductor from east to west. The direction of the magnetic field at a point above the conductor is
(a) towards east     (b) towards west
(c) towards north     (d) towards south

52. A bar magnet is equivalent to :
(a) torroid carrying current
(b) straight conductor carrying current
(c) solenoid carrying current
(d) circular coil carrying current.

53. Excitation energy of a hydrogen like ion in its first excitation state is 40.8 eV. Energy needed to remove the electron from the ion in ground state is :
(a) 40.8 eV     (b) 27.2 eV
(c) 54.4 eV     (d) 13.6 eV

54. The refractive index of a particular material is 1.67 for blue light, 1.65 for yellow light and 1.63 for red light. The dispersive power of the material is
(a) 0.031     (b) 1.60
(c) 0.0615     (d) 0.024

55. An ideal gas heat engine operates in a Carnot's cycle between 227°C and 127°C. It absorbs $6 \times 10^4$ J at high temperature. The amount of heat converted into work is :
(a) $1.6 \times 10^4$ J     (b) $1.2 \times 10^4$ J
(c) $4.8 \times 10^4$ J     (d) $3.5 \times 10^4$ J

56. Which one of the following graphs represents the behaviour of an ideal gas ?
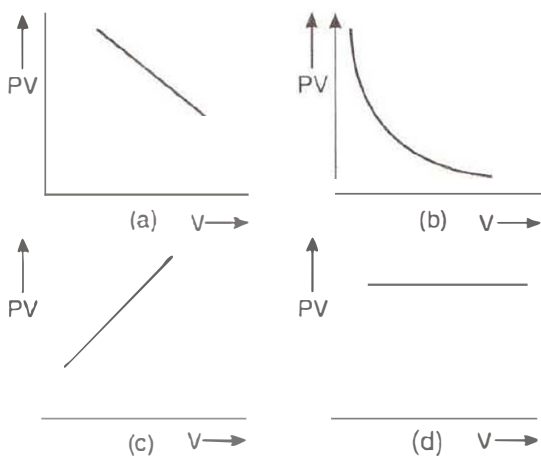


57. Rainbow is formed due to :
(a) total internal reflection
(b) scattering
(c) refraction
(d) dispersion and total internal reflection

58. A beam of parallel rays is brought to focus by a plano-convex lens. A thin concave lens of the same focal length is joined to the first lens. The effect of this is :
(a) the focus shifts to infinity
(b) the focal point shifts towards the lens by a small distance
(c) the focal point shifts away from the lens by a small distance
(d) the focus remains undisturbed

59. When a body is earth connected, electrons from the earth flow into the body. This means the body is
(a) charged negatively
(b) an insulator
(c) uncharged
(d) charged positively

60. Effective capacitance between $A$ and $B$ in the figure shown is (all capacitances are in µF) :



(a) $\frac{3}{14}$ µF
(b) $\frac{14}{3}$ µF
(c) 21 µF
(d) 23 µF

# Answer – Key

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. d | 2. d | 3. d | 4. b | 5. a | 6. d | 7. d | 8. a | 9. d | 10. a |
| 11. d | 12. a | 13. c | 14. c | 15. c | 16. c | 17. a | 18. c | 19. d | 20. c |
| 21. a | 22. c | 23. b | 24. d | 25. c | 26. b | 27. c | 28. b | 29. d | 30. a |
| 31. a | 32. d | 33. b | 34. d | 35. d | 36. d | 37. b | 38. d | 39. b | 40. a |
| 41. c | 42. b | 43. b | 44. d | 45. b | 46. c | 47. d | 48. a | 49. b | 50. a |
| 51. c | 52. c | 53. c | 54. c | 55. b | 56. d | 57. d | 58. a | 59. d | 60. b |